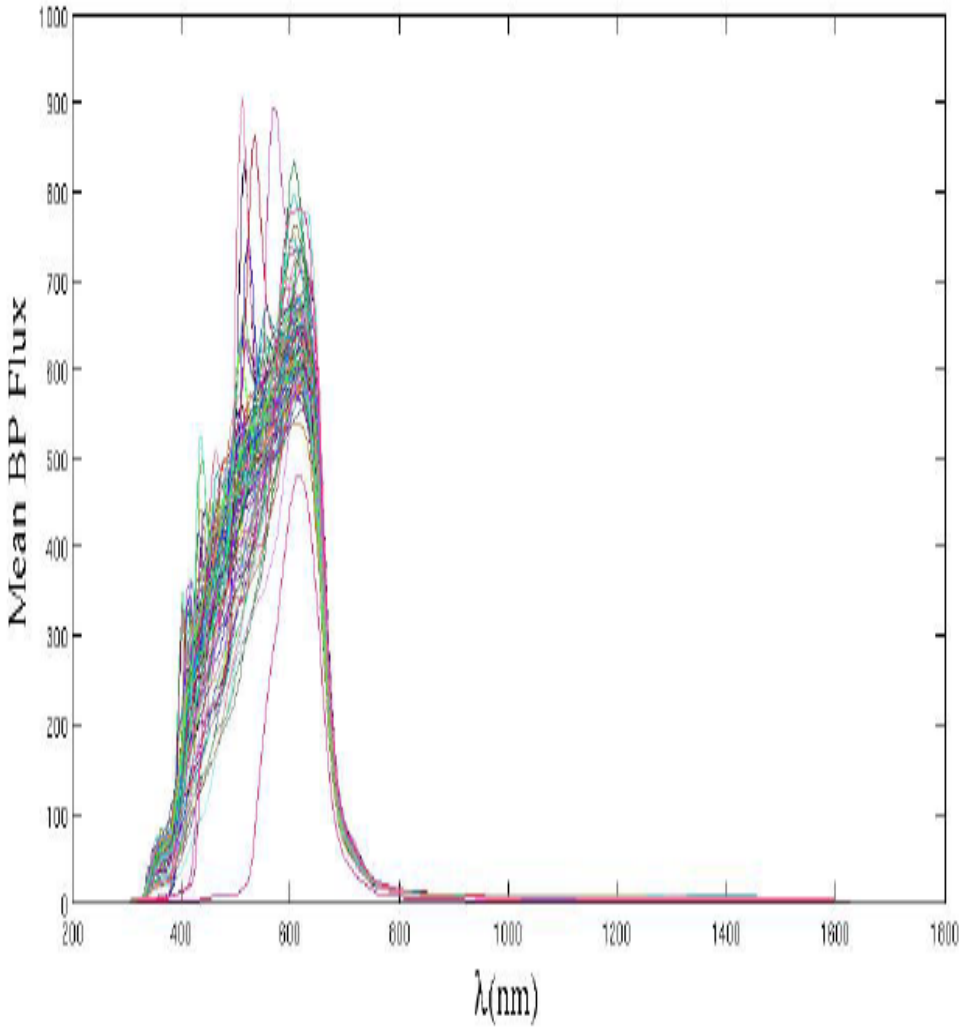
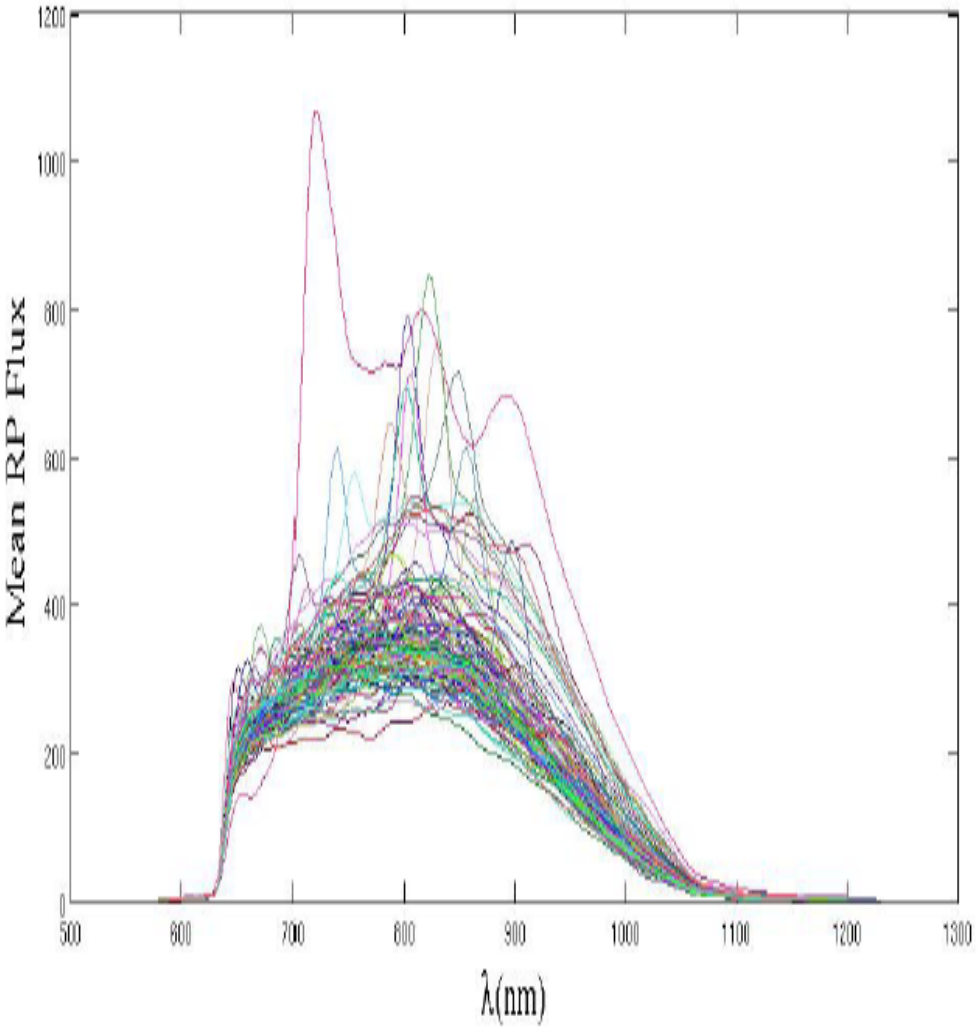
Gaia DU831-QSOC

Nice 10-11 / 09 / 2012

Collaborators : J. Surdej, J. Poels, L. Delchambre and P. Geurts

Some plots of QSO SDSS DR7 BP/RP combined spectra





QSOC (Quasar Classifier)

- APs derivation (redsift, quasar type, …) using BP/RP spectra:
  - BP / RP spectrum = 180 pixels each = function { quasarType, redshift, spectral index (the power law continuum slope), the total equivalent width, the dust extinction}

- Preparation of the training data for QSOC and for DSC:
  - DSC = Discrete Source Classifier is the heart of CU8. It classifies sources using BP/RP, RVS, Astrometry and Gmag.
  - DSC : very good QSO classification (> 80% true positives)
  - DSC responsible : Kester Smith from MPIA

Training data preparation

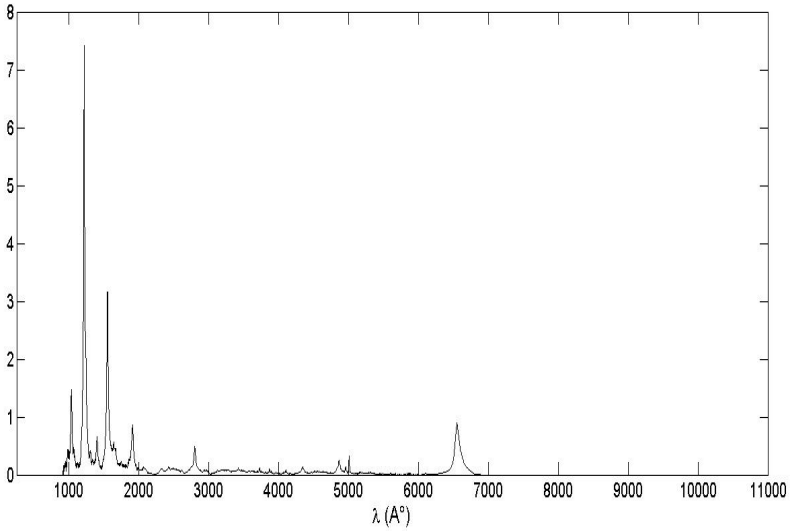
- 2 families of data :
  - Purely synthetic.
  - Semi synthetic : extrapolation of SDSS spectra from [380,920]nm to the BP/RP range [300,1100]nm

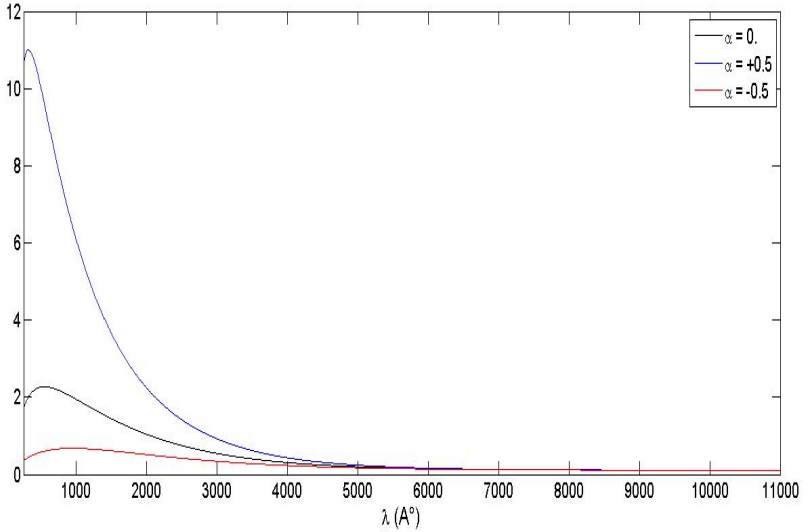
- Quasar types : should we use templates, Principal components ?
  - BAL QSOs (10% of QSOs) : no general template
  - Type1 and Type2 (20% of QSOs) : no defined class border.

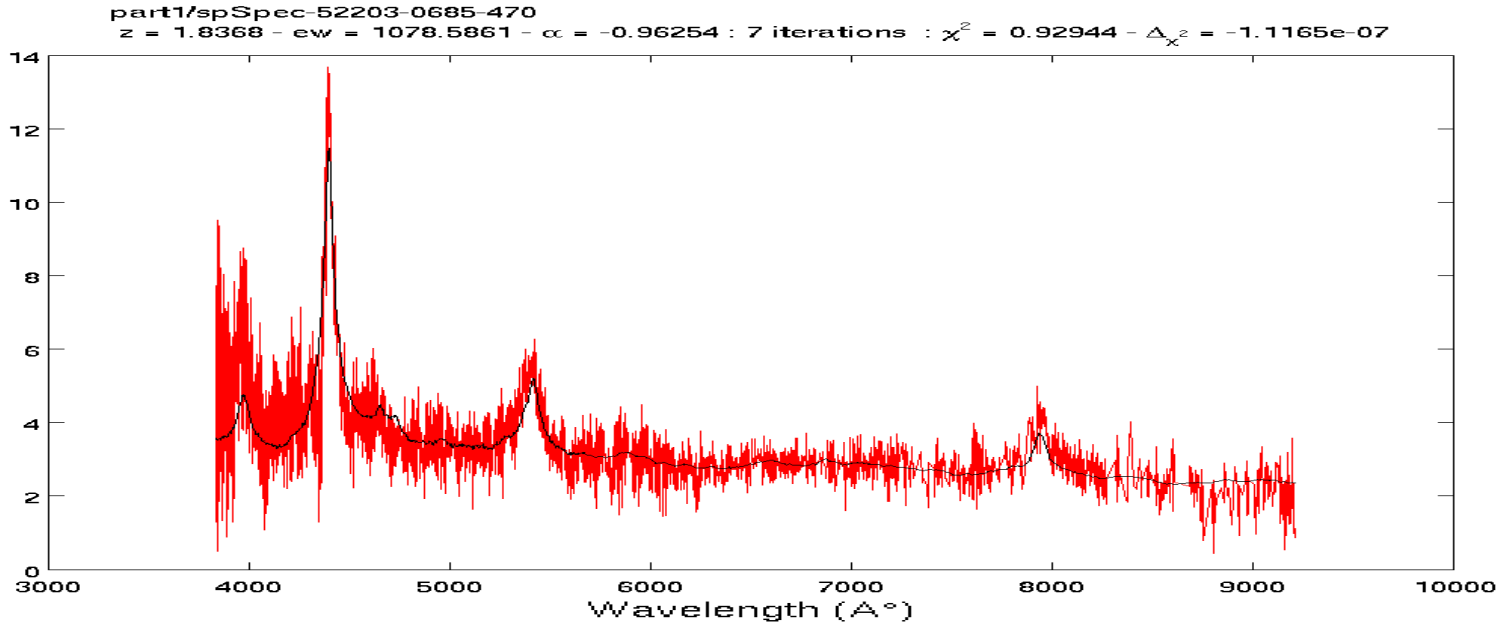
- Continuum modeling : 1 or 2 combined power laws.

- Dust extinction : at which resdhift it happens ?

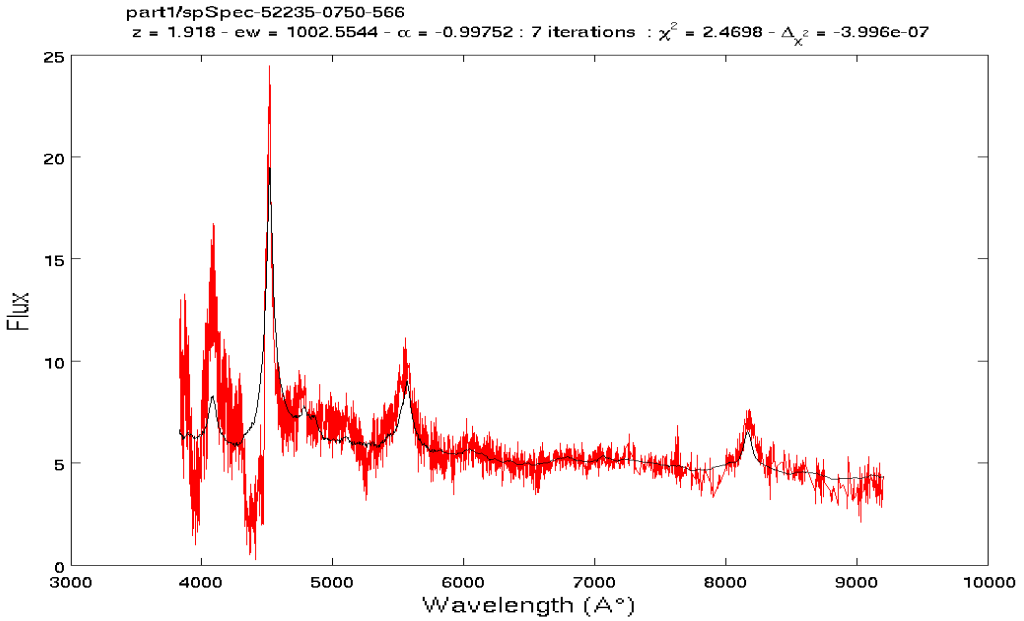
Training data preparation : Template + continuum



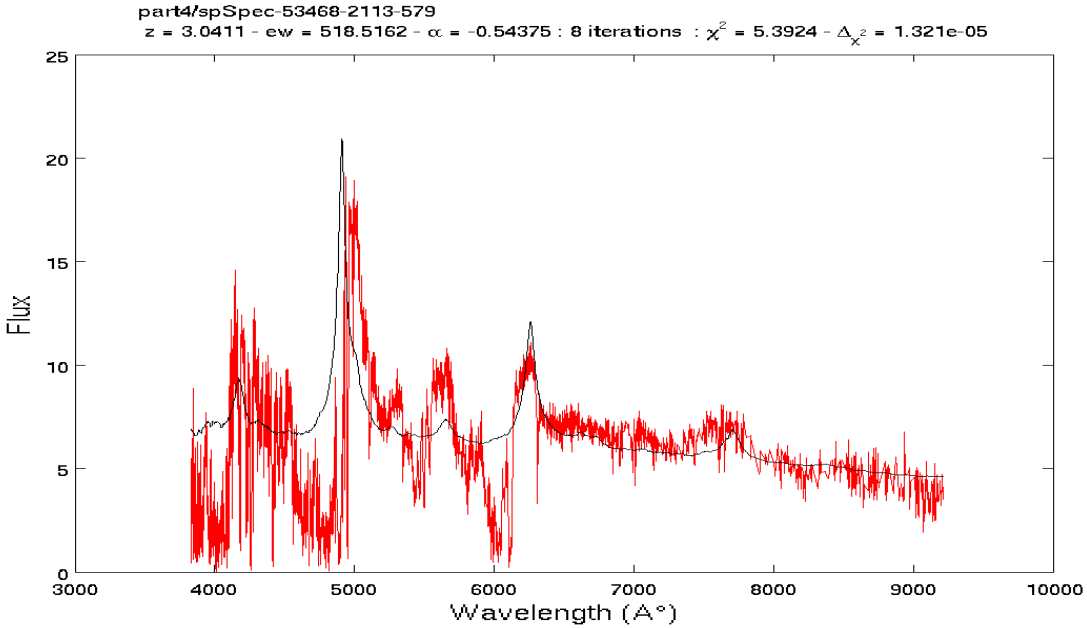




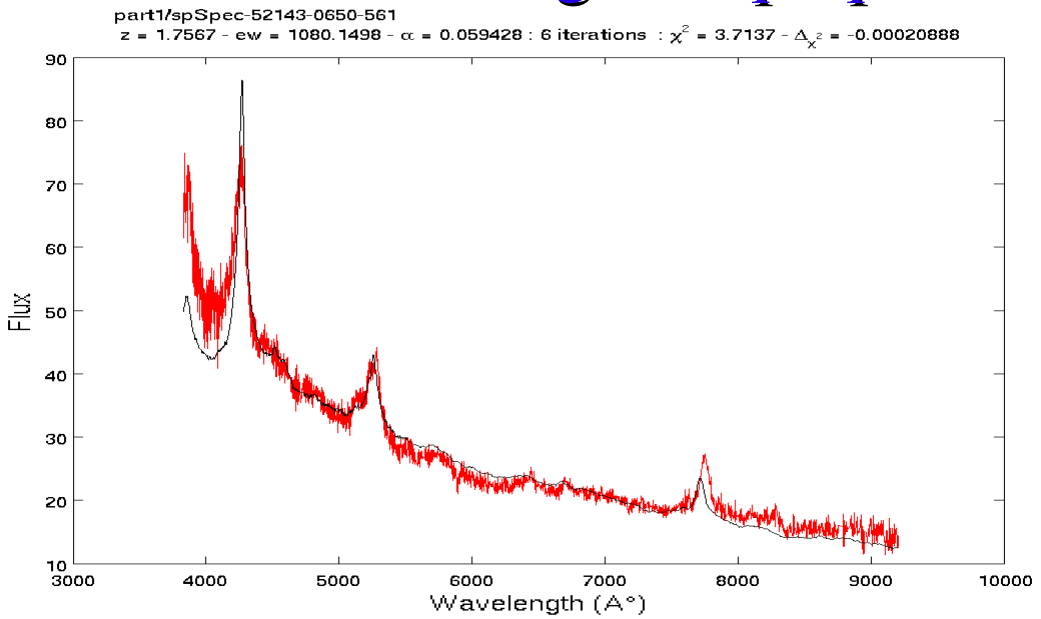
Training data preparation : Template + continuum



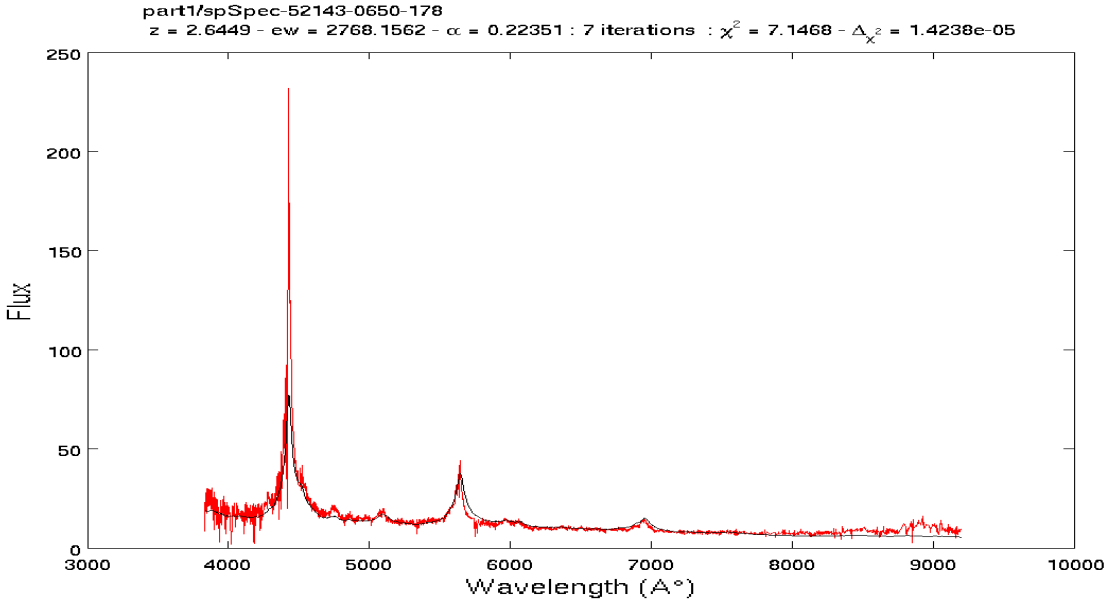
BALs



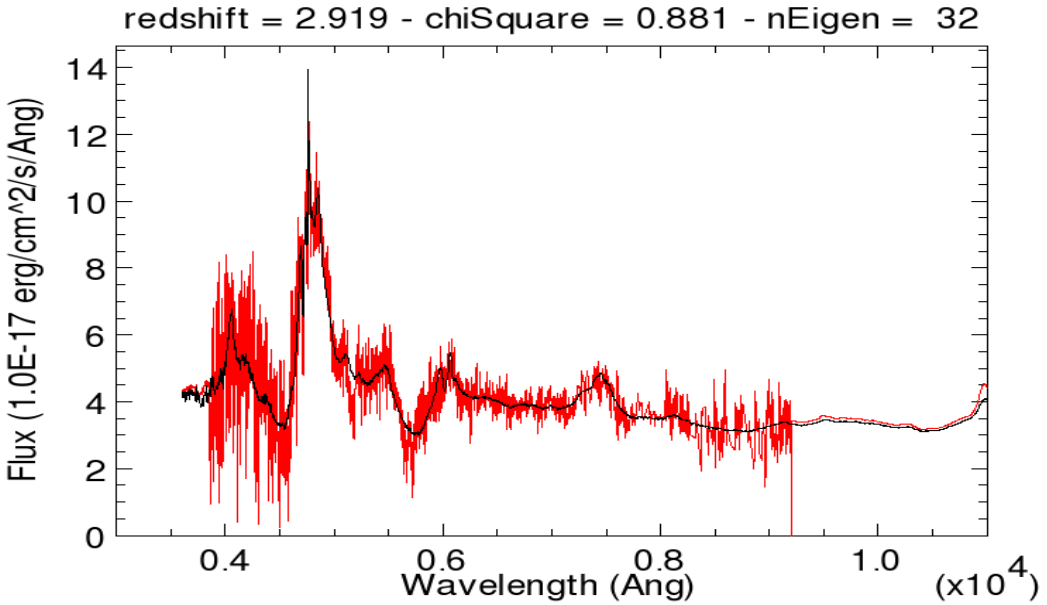
Training data preparation : Template + continuum



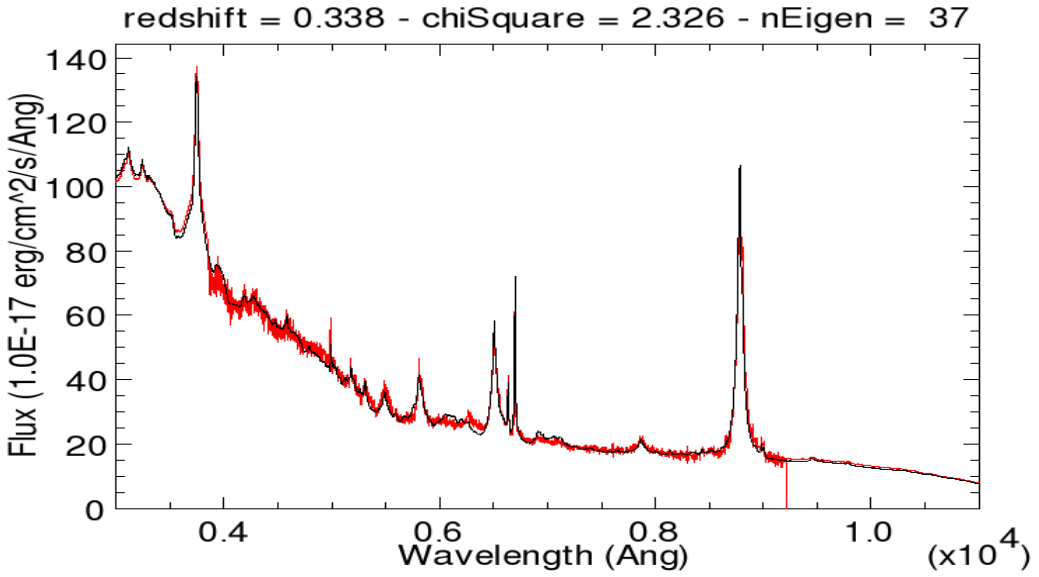
- Differential RedShift
- ≠ Line (Amplitude – Width)



Training data preparation : PCA

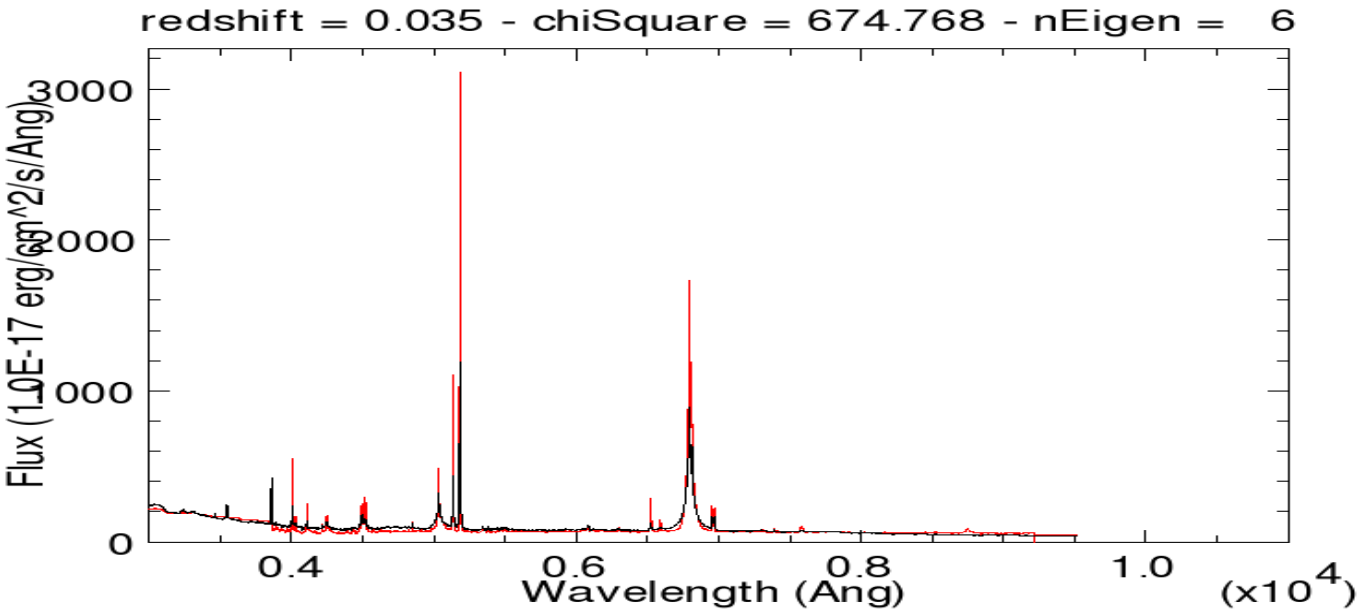


Yip et al. 2004, AJ, 128, pp 2603-2630



Training data preparation : PCA

- Better performances comparing to « Template + Continuum » method.
- Numerical difficulties : how to ensure positive fluxes in the extrapolated ranges.
- Can be improved by separating quasar types : PCs for each type (under progress).



QSOC : Ideal organogram.

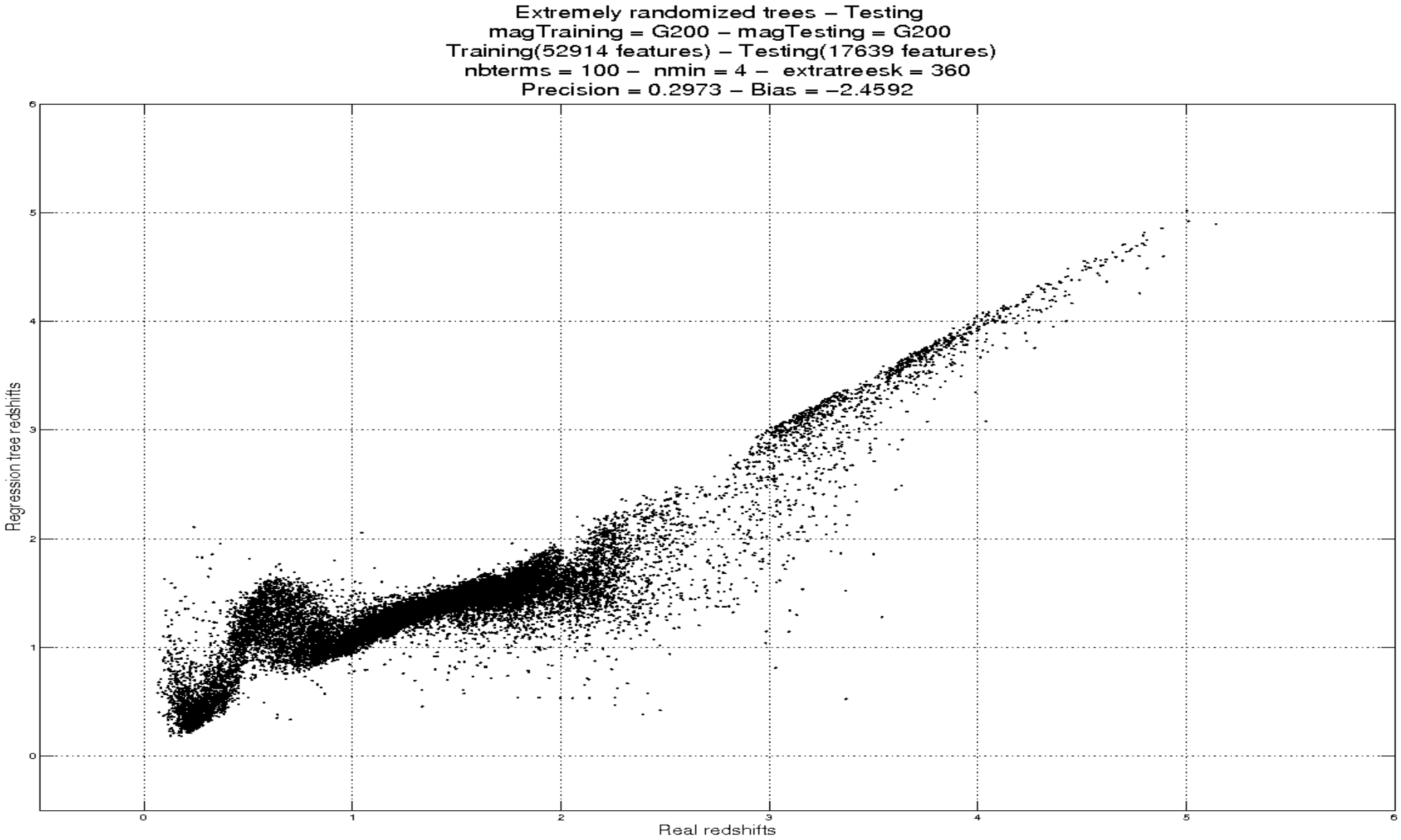
- Foreach AP {redshift, continuum slope, total equivalent width, extinction} : finds and approached value by combining 2 (or more) pattern recognition algorithms (ERT, Annz, SVMc).

- Finds the quasar type using classification pattern recognition algorithm (SVMc or ERT).

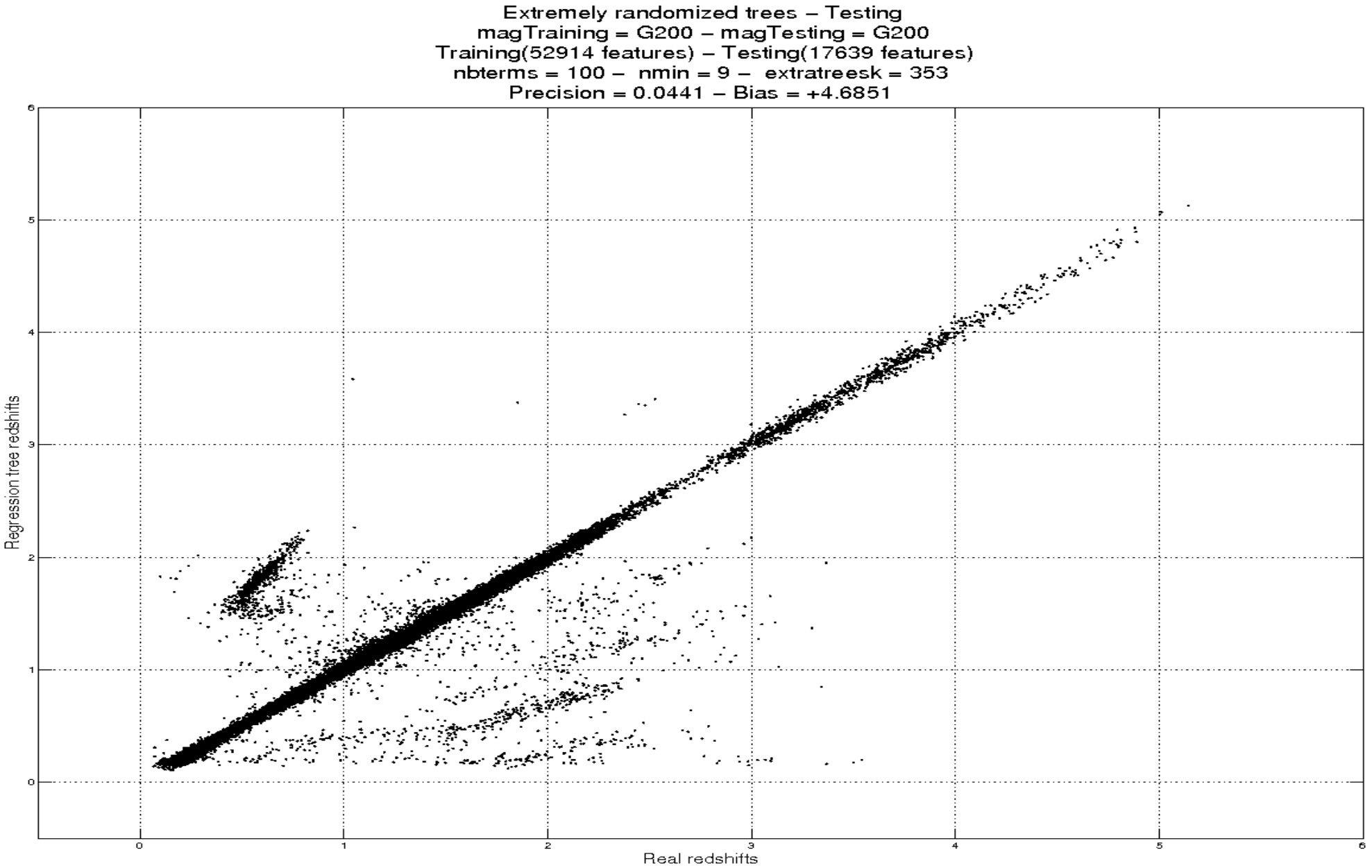
- Uses inference to improve the approached APs using the extinction parameters from CU8/TotalGalacticExtinction package.

- Using a general minimisation process to refine the aproached APs using noise-free reference library => variance matrix and GoF.

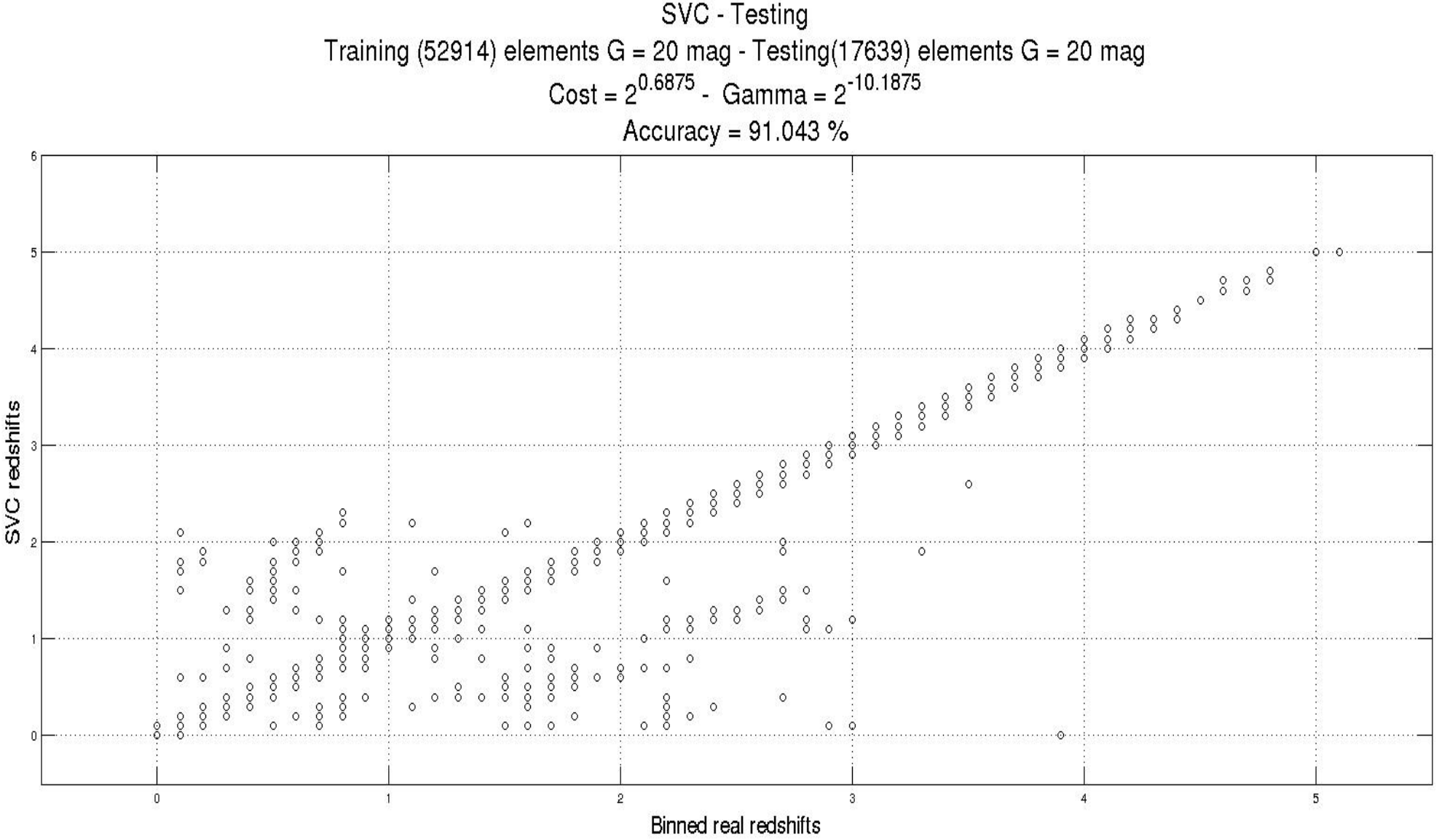
QSOC : ERT predictions by minimising the total RMS



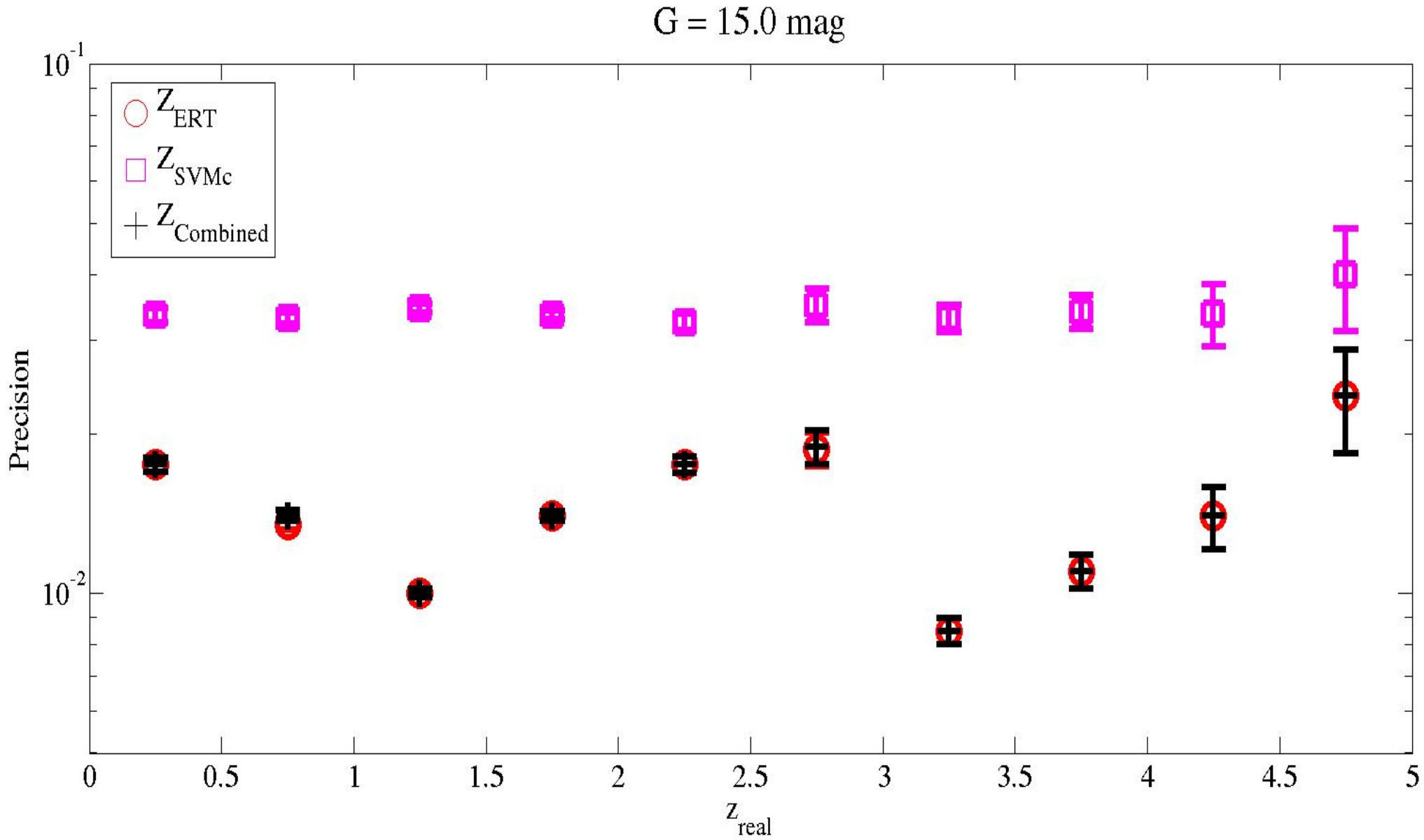
QSOC : ERT predictions by minimising the precision



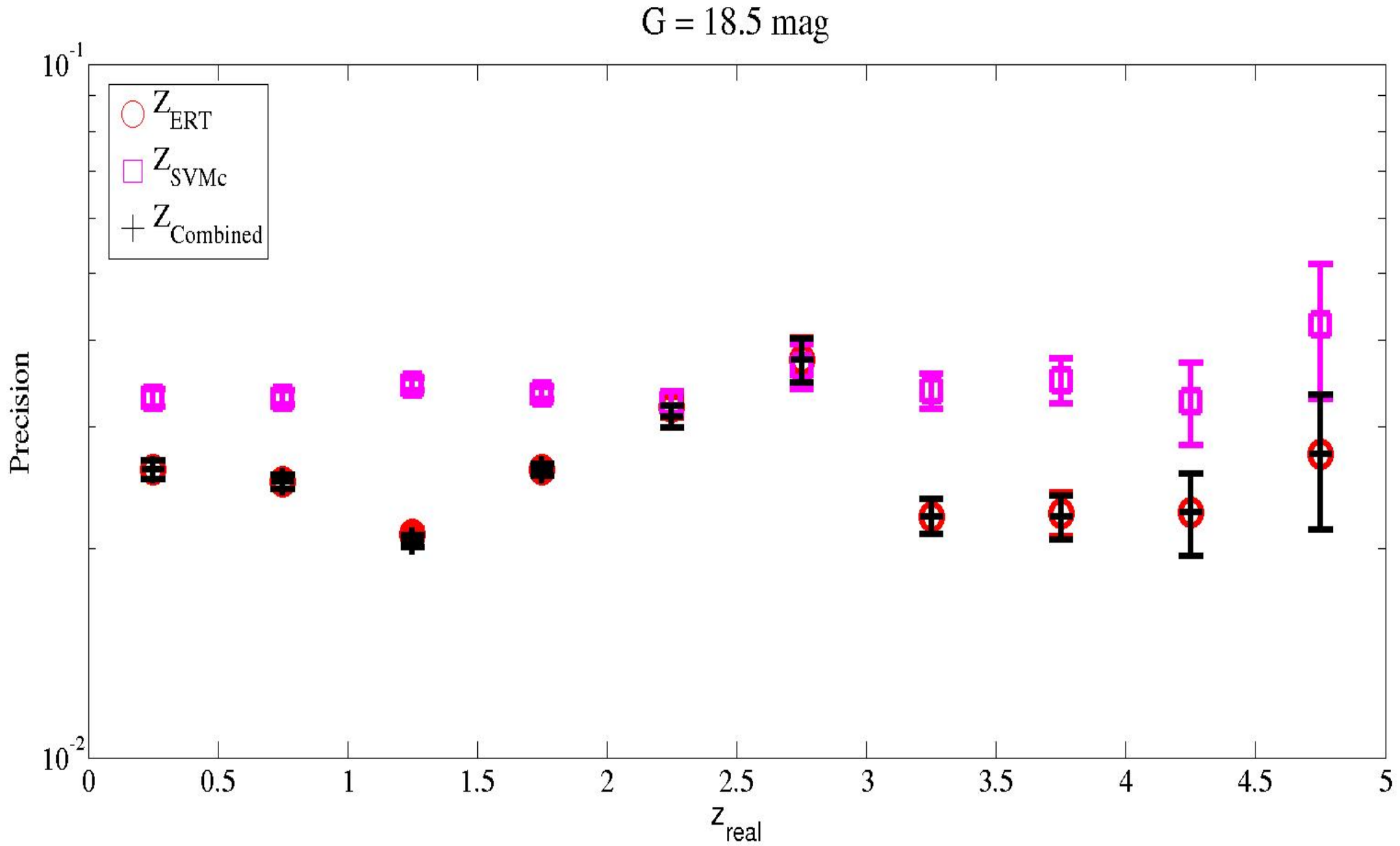
QSOC : SVM prediction



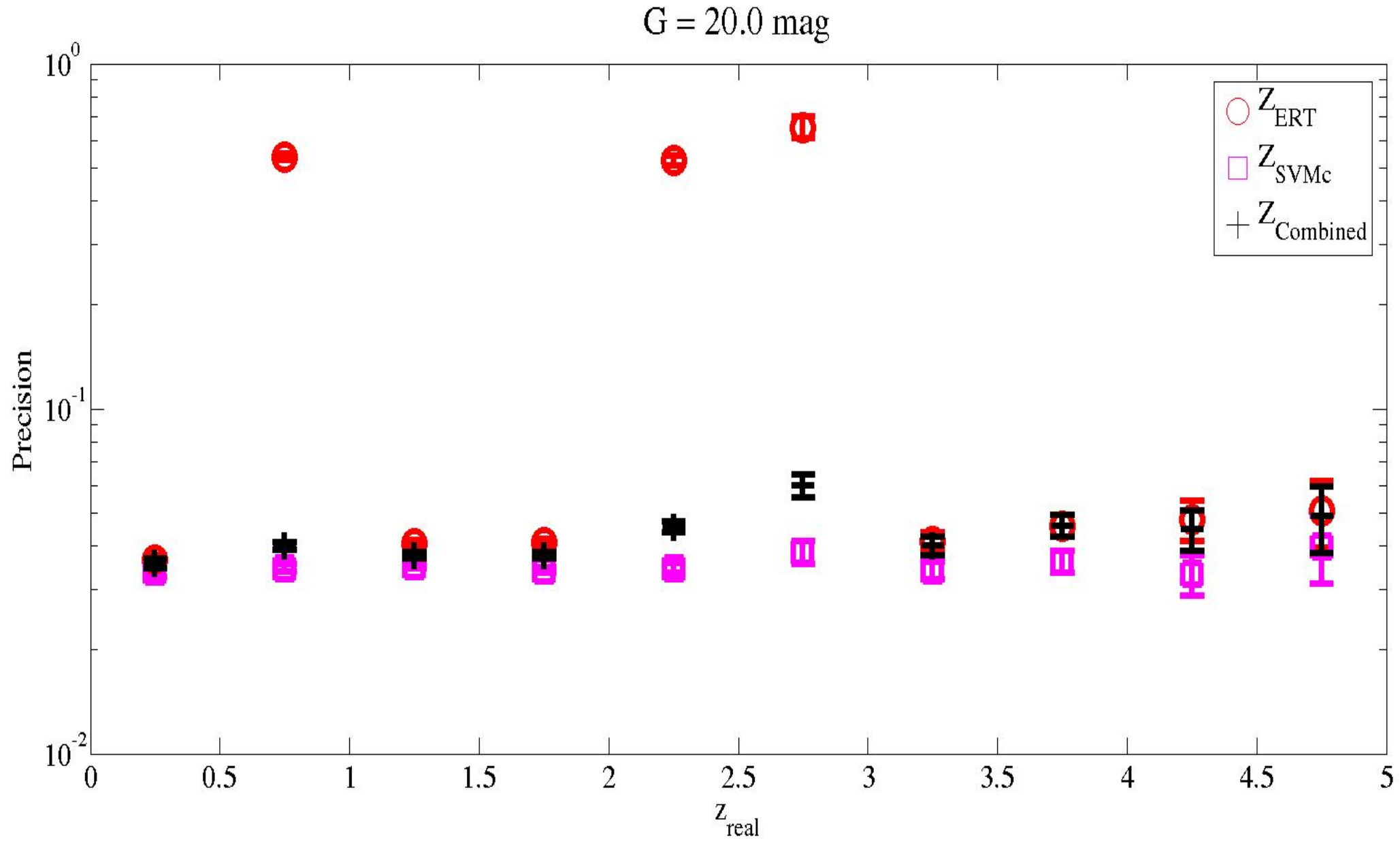
QSOC 12.0 : Some results (SDSS Cycle 8)



QSOC 12.0 : Some results (SDSS Cycle 8)



QSOC 12.0 : Some results (SDSS Cycle 8)



QSOC : redshift error bars

(Zscore measures the precision of derived error bars)

